

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for forming a V-groove in a substrate having a varying width, comprising:

dry etching at least one pit having a plurality of sides in the substrate;

coating the sides of the at least one pit with a material which is resistant to a wet etchant; and

wet etching first and second sections of the substrate to form first and second groove sections each having a sidewall, wherein each sidewall of the first and second groove sections ~~each adjoin~~ intersect a respective intersecting side[[s]] of the pit at a non-orthogonal angle relative to a longitudinal axis of the respective groove section.

2. (Previously Presented) The method of claim 1, wherein said dry etching comprises dry etching first, second and third pits in the substrate.

3. (Previously Presented) The method of claim 2, wherein said first section of the substrate is between the first and second pits and said second section of the substrate is between the second and third pits.

4. (Original) The method of claim 3, wherein the first section has a different width than the second section.

5. (Original) The method of claim 4, wherein the first section is wider than the second section.

6. (Original) The method of claim 1, wherein said dry etching comprises at least one of the group consisting of deep reactive ion etching, ion beam milling, laser-chemical etching, laser ablation, and laser drilling.

7. (Previously Presented) The method of claim 1, wherein said coating comprises coating sides of the at least one pit with a material comprising silicon nitride.

8. (Previously Presented) The method of claim 1, wherein said coating comprises coating sides of the at least one pit with a material comprising silicon dioxide.
9. (Original) The method of claim 1, further comprising removing said coating.
10. (Original) The method of claim 1, wherein said wet-etching sections comprises wet-etching V-grooves.
11. (Original) The method of claim 1, wherein said wet-etching sections comprises wet-etching U-grooves.
12. (Original) The method of claim 1, further comprising smoothing corners of the at least one pit.
13. (Original) The method of claim 12, wherein said smoothing comprises etching.
14. (Original) The method of claim 12, wherein said smoothing comprises thermal oxidation.
15. (Currently Amended) A tapered groove formed in a <100> silicon substrate, comprising:
 - a pit in a <100> silicon substrate, the pit having a plurality of sides; and
 - at least two wet-etched sections in the <100> silicon substrate, wherein a first said wet-etched section has a different width than a second said wet-etched section, and wherein the first and second wet-etched sections each comprise a sidewall adjoin that intersects a respective intersecting side[[s]] of the pit at a non-orthogonal angle relative to a longitudinal axis of the groove.
16. (Previously Presented) The groove of claim 15, further comprising, second and third pits in the substrate.
17. (Original) The groove of claim 16, wherein said first wet-etched section is between said first and second pits and said second wet-etched section is between said second and third pits.
18. (Original) The groove of claim 17, wherein said first wet-etched section is wider than said second wet-etched section.

19. (Previously Presented) The groove of claim 16, wherein said pits have a diamond-shaped profile.

20. (Original) The groove of claim 19, wherein said pits include wings.

21. (Original) The groove of claim 15, wherein said pits are shaped to inhibit wedges.

22. (Original) The groove of claim 21, wherein corners of said pits are smoothed.

23. (Currently Amended) An optical coupler, comprising:

a substrate having a tapered groove formed of a plurality of spaced apart dry-etched pits joined together with wet-etched sections of varying width, wherein the dry-etched pits extend into the substrate to a depth greater than the wet-etched sections, the dry-etched pits each having a side and the wet-etched sections each having a sidewall and a longitudinal axis, wherein the side of each dry-etched pit intersects a respective sidewall of an adjoining wet-etched section at a non-orthogonal angle relative to the longitudinal axis of the respective wet-etched section; and

an optical fiber mounted in said wet-etched sections of said tapered groove.

24. (Original) The optical coupler of claim 23, wherein said optical fiber is bowed.

25. (Original) The optical coupler of claim 23, wherein said substrate comprises first, second and third pits.

26. (Original) The optical coupler of claim 25, wherein said substrate comprises first and second wet-etched sections, said first wet-etched section is between said first and second pits and said second wet etched section is between said second and third pits.

27. (Original) The optical coupler of claim 26, wherein said first wet-etched section is wider than said second wet-etched section.

28. (Original) The optical coupler of claim 23, wherein said pits have a diamond-shaped profile.

29. (Original) The optical coupler of claim 28, wherein said pits include wings.

30. (Original) The optical coupler of claim 23, wherein said pits are shaped to inhibit wedges.

31. (Original) The optical coupler of claim 30, wherein corners of said pits are smoothed.
32. (Previously Presented) The optical coupler of claim 23, wherein the substrate is a <100> silicon substrate.
33. (Previously Presented) The optical coupler of claim 23, wherein the dry-etched pits have a width greater than the width of the adjoining wet-etched sections.
34. (Previously Presented) The method of claim 1, wherein the respective intersecting sides of the pit each form a corner aligned with a respective midline of the first and second grooves.
35. (Previously Presented) The groove of claim 15, wherein the respective intersecting sides of the pit each form a corner aligned with a respective midline of the first and second grooves.
36. (Previously Presented) The optical coupler of claim 23, wherein the dry-etched pits each comprise a corner aligned with a respective midline of the wet-etched sections.

of the pit at a non-orthogonal angle relative to a longitudinal axis of the respective groove section”, as set forth in independent claim 1. As described in more detail in applicant’s specification at paragraph [0025] and with reference to the exemplary embodiment illustrated in Figures 2-3, diamond-shaped pits 30, 32, 34, 36 may be provided which have sides that intersect the V-groove sections at a non-orthogonal angle relative to the longitudinal axis of the V-groove section intersected. Such structures can suppress the formation of wedges in the V-groove sections which would not be suppressed if intersection were made at an orthogonal angle, as illustrated in Figure 21.

The specification further states that any shape which provides a projection (e.g., intersection at a non-orthogonal angle) into the V-grooves section may be used (specification at paragraph [0025]). It is desired to suppress wedge formation, for example, because a wedge may interfere with proper placement of an optical fiber in the V-groove sections. In this regard, claim 1 has been amended to recite the non-orthogonal intersection between pit side and V-groove sidewall. Such a structure is not disclosed or suggested by *Tabuchi* (see Official Action at page 2).

Accordingly, withdrawal of the rejection with respect to claim 1 and the claims dependent therefrom is in order.

Regarding independent claim 15, *Tabuchi* does not disclose or suggest “at least two wet-etched sections ... wherein the first and second wet-etched sections each comprise a sidewall that intersects a respective side of the pit at a non-orthogonal angle relative to a longitudinal axis of the groove”, as set forth in claim 15. *Tabuchi* does not disclose or suggest at least the above-quoted features of claim 15, for the reasons provided above with regard to claim 1.

Accordingly, withdrawal of the rejection with respect to independent claim 15 and the claims dependent therefrom is in order.

Regarding independent claim 23, *Tabuchi* does not disclose or suggest “a substrate having a tapered groove formed of a plurality of spaced apart dry-etched pits joined together with wet-etched sections of varying width, ... , the dry-etched pits each having a side and the wet-etched sections each having a sidewall and a longitudinal axis, wherein the side of each dry-etched pit intersects a respective sidewall of an adjoining

wet-etched section at a non-orthogonal angle relative to the longitudinal axis of the respective wet-etched section”, as set forth in claim 23. (Emphasis Added.) *Tabuchi* does not disclose or suggest at least the above-quoted features of claim 23, for the reasons provided above with regard to claim 1.

Accordingly, withdrawal of the rejection with respect to independent claim 23 and the claims dependent therefrom is in order.

For at least these reasons, withdrawal of the rejections based on *Tabuchi* is respectfully requested.

Claims 15-18, 23, 25-27, 32, 33, and 36 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Nakanishi* (U.S. Patent No. 6,257,772).

Regarding independent claim 15, *Nakanishi* does not disclose or suggest “at least two wet-etched sections ... wherein the first and second wet-etched sections each comprise a sidewall that intersects a respective side of the pit at a non-orthogonal angle relative to a longitudinal axis of the groove”, as set forth in claim 15. *Nakanishi* does not disclose or suggest at least the above-quoted features of claim 15 for the reasons provided above with regard to claim 15. For example, in a similar manner to *Tabuchi*, *Nakanishi* merely discloses a partition groove 36 having a front wall 38 that intersects V-grooves 34, 35 at an angle orthogonal to the longitudinal axis of the grooves 34, 35.

Accordingly, withdrawal of the rejection with respect to independent claim 15 and the claims dependent therefrom is in order.

Regarding independent claim 23, *Nakanishi* does not disclose or suggest “a substrate having a tapered groove formed of a plurality of spaced apart dry-etched pits joined together with wet-etched sections of varying width, ... , the dry-etched pits each having a side and the wet-etched sections each having a sidewall and a longitudinal axis, wherein the side of each dry-etched pit intersects a respective sidewall of an adjoining wet-etched section at a non-orthogonal angle relative to the longitudinal axis of the respective wet-etched section”, as set forth in claim 23. *Nakanishi* does not disclose or suggest at least the above-quoted features of claim 23, for the reasons provided above regarding the rejection of claim 23 in view of *Tabuchi*.

Accordingly, withdrawal of the rejection with respect to independent claim 23 and the claims dependent therefrom is in order.

For at least these reasons, withdrawal of the rejections based on *Nakanishi* is respectfully requested.

Allowable Subject Matter

Applicant notes with appreciation the indication that claims 4, 5, 19-22, 24, 28-31, and 34-35 would be allowable if rewritten in independent form. However, for the reasons presented above, Applicant respectfully submits that such claims are allowable in their present form.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at her earliest convenience.

Respectfully submitted,



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